NISTTech

Large Ship-to-Ship Transfer Crane

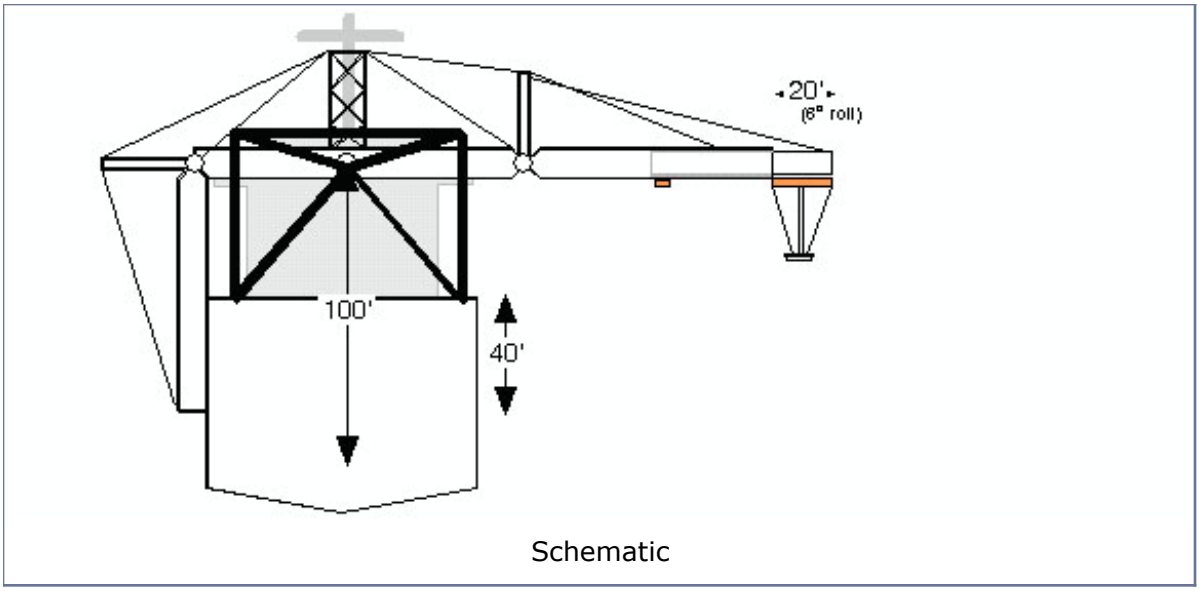
Safely transfer cargo between rapidly traveling ships at sea

Description

This system allows the safe transfer of cargo between two ships traveling at sea at high speed by compensating for rolls produced by waves and wind. The design is a crane concept where a set of independently controlled manipulators move a load from a base ship to a target ship. One controller, the macro controller, installed on the base ship's transfer crane (cargo boom), compensates for motion of the base ship. The second controller, the micro controller, installed on the terminal or hook end of the boom compensates for motion of the target ship. The combined operation of the two controllers enables safe and efficient transfer of cargo at sea even under severe conditions of a Sea-State 5, corresponding to roll, pitch and yaw angles of 15 degrees.

As cargo ships continue to increase in size and shore-based docking facilities for loading and unloading cargo become less available, a need exists for cargo transfer at sea and away from land-based docking facilities. Also, ships carrying military cargo and operating in hostile locations might not have access to shore unloading facilities. One solution to this problem is to transfer cargo at sea between a larger cargo ship (base ship) and a smaller transport ship (target ship). But off-shore transfer of cargo is difficult at sea because waves and wind may cause the base and target ships to move independently of each other, thus resulting in unacceptable movement of the cargo during transfer. The NIST invention addresses this problem.

Images



Schematic

Applications

- **Military, merchant marines and industrial shipping**
  Offloads cargo in unprotected waters.
- **Oil exploration**
  Convenient for use on oil platforms or supply ships.
- **Shipping**
  Transfers cargo in areas where docking is not available.

Advantages

- **Stable in rough seas**
  Reduces the motion required to compensate for rough seas and large waves while transferring cargo in open water.
- **Adaptable**
  Accommodates both lateral and rotational movement caused by secondary ships in the area.
- **Compatible**
  Use with additional port cranes to minimize cargo on-load/off-load time.

Abstract

The invention describes a crane concept to facilitate the transfer of containerized cargo between two ships at sea. The invention uses a macro/micro design under which a serial set of independently controlled manipulators move a load from a base ship to a target ship. The manipulator mounts on a ship which is moved by the actions of sea and wind. The macro-manipulator is a modified container crane. The modifications compensate for large motions of the base ship. The micro-manipulator moves the load and compensates for the motions of the receiving ship and the unscheduled motions of the base ship remaining after the macro-manipulator compensation.

Inventors

- Bostelman, Roger V.
- Kjolseth, Paul
- May, Ed
- Norcross, Richard J.

References

- U.S. Patent Application # 20060151412

- Docket: 05-003US

Status of Availability

This invention is available for licensing.

Last Modified: 01/13/2010